CALIFORNIA OAK MORTALITY TASK FORCE REPORT
SEPTEMBER 2005

MONITORING

The first *Phytophthora ramorum* caused cankers on *Taxus brevifolia* (Pacific yew) have been identified on a tree in Mendocino County. Bleeding symptoms were noticed on Pacific yew among infected CA bay laurel, tanoak, woodrose, evergreen huckleberry, and CA honeysuckle. Having been identified as *P. ramorum*-positive five months earlier, with branches exhibiting dieback symptoms, the same tree was found to have a bleeding canker six inches above the soil line on the mainstem in June. When the bark was removed, a canker with a distinct margin was present. In July, the area surrounding the canker was examined further. Bark lower on the trunk was removed where no bleeding was evident, yet additional cankers were present. Isolations were made from the canker margin, and *P. ramorum* was recovered. PCR testing has not been performed, and CDFA has not confirmed the findings. This was an understory tree with severe foliar dieback; it appears to be dying. In addition, symptoms similar to those observed on *P. ramorum*-infected Douglas-fir and *Torreya californica* were observed on multiple Pacific yews in this area. Symptoms consisted of wilted, necrotic shoots and twig cankers on multiple branches. *P. ramorum* was recovered from the margins of twig cankers when plated onto PARP medium. Twig cankers were observed on three understory yews.

The USDA Forest Service mapped Sudden Oak Death mortality in the Los Padres National Forest and along the Big Sur Coast August 25th and 26th. Mortality was found to be extensive in Partington Canyon and along the Big and Little Sur Rivers. See photos in the Image Gallery. Much of the infested land identified was in the Ventana Wilderness. Resource managers are concerned about increased fire risk due to the amount of dead woody debris. The flight noted increased tanoak mortality in the southern-most known *P. ramorum* infested areas (Willow and Plaskett Creeks), just north of the San Luis Obispo border; however, several canyons between Julia Pfeiffer Burns State Park and Plaskett Creek along the southern Big Sur Coast appear to remain uninfested. The area was flown last year, and found to have an estimated 8,000 acres of mortality and 119,000 dead tanoaks and oaks. These helicopter-based surveys are not ground-checked; attribution of tree death cause is based on symptoms. For more information, contact John Kelly, Los Padres NF, at jhkelly@fs.fed.us.

Results of the 2005 *Phytophthora ramorum* Humboldt County aerial, ground, and stream survey efforts reveal more host infestation and spread in southern Humboldt County.

In 2002, a geographically isolated area of infected California bay laurel trees was identified in the southern part of Humboldt County in the town of Redway. Following an experimental treatment project in February 2004 to attempt to control the limited number of infected California bay laurel trees in Redway, a collaborative survey began to delimit the infested area and to test the feasibility of future control treatments. The survey

strategy used aerial detection, watershed monitoring, and a residential and wildland ground-based survey approach in and around the Redway/Garberville region. Partners in this strategy included UC Cooperative Extension (UCCE) Humboldt/Del Norte County, the Humboldt County Department of Agriculture, the UC Davis Department of Plant Pathology Rizzo Lab, the UC Berkeley Garbelotto Lab, the California Department of Food and Agriculture, the USDA Forest Service, the California Department of Forestry and Fire Protection (CDF), Hoopa Tribal Forestry, Yurok Tribal Forestry, the Bureau of Land Management, and numerous private and public landowners who granted permission to survey their properties.

P. ramorum has now been found surrounding the Redway/Garberville area, covering a region at least 7 km x 7.8 km (54.6 km^2, or 21 mi^2) stretching from Sproul Creek in the south to Dean Creek in the northeast, near Briceland in the northwest, and Garberville on the east. Pathologists and foresters from the University of California, USDA Forest Service, and CDF recognize that the disease is operating at a scale that is much more difficult to manage than previously thought. While there has been continuous sampling for the pathogen in the region, this is the most comprehensive study of the distribution of the pathogen in Humboldt County to date.

Management of *P. ramorum* at a landscape scale has not been attempted before in California. The group recommends an adaptive management approach that attempts to contain the pathogen within the smallest geographic area possible, treating the area much like a wildfire containment area. Experimental treatments will be applied, where landowner permission and funding can be obtained, to the perimeter of the infected areas in the hope of containing the pathogen and preventing spread to other watersheds. Bay and tanoak, the primary hosts for the pathogen in the region, will be removed within this "ridgeline host reduction zone" as the highest priority for treatment. Any new infected areas outside the perimeter will be aggressively treated. Within the perimeter of the infested area, the cooperators hope to compare the success of various treatment approaches as well as reduce inoculum levels in the areas with the greatest apparent concentration of *P. ramorum.* A detailed report of findings and proposed treatment strategies will be made available soon. For a map of the 2005 Southern Humboldt *P. ramorum* Survey Status, click here. For more information on the survey or Humboldt's *P. ramorum* program, contact UCCE Humboldt/Del Norte's Yana Valachovic at: yvala@ucdavis.edu or Chris Lee at: cale@ucdavis.edu.

REGULATIONS

The UK Department of Environment, Food, and Rural Affairs (DEFRA) has officially identified, and reported to the USDA Animal and Plant Health Inspection Service (APHIS), three new *P. ramorum*-infected plants. *Acer laevigatum* – Aceraceae (Evergreen maple), *Michelia doltsopa* – Magnoliaceae (Michelia), and *Quercus petraea* – Fagaceae (Sessile oak) were found in UK outdoor, green areas and were natural infected. While *P. ramorum* culturing has been completed, Koch's Postulates have not. Consequently, these newly identified hosts will join the USDA APHIS associated plants

list, and will be published as a regulatory update in the Federal Register for public comment. For more information on these hosts, see Hosts of the Month below.

Five new *P. ramorum* hosts have been identified in the forests of California's quarantined counties after suspicious symptoms prompted testing. The newly confirmed *P. ramorum*-susceptible plants are: *Adiantum aleuticum* – Polypodiaceae (Maidenhair fern), *Fraxinus latifolia* – Oleaceae (Oregon ash), *Osmorhiza chilensis* – Apiaceae (Sweet Cicely), *Torreya californica* – Taxaceae (California nutmeg), and *Vancouveria planipetala* – Berberidaceae (Redwood ivy). *P. ramorum* culturing has been completed on all five of the confirmed hosts, but Koch's Postulates have not. Consequently, these newly reported hosts will be added to the USDA APHIS associated host list, and they will be published as a regulatory update in the Federal Register for public comment. For more information on these hosts, see Hosts of the Month below.

NURSERIES

A South Carolina wholesale nursery/broker in Jasper County has been found to have a *P. ramorum*-positive *Camellia japonica* (Professor Sergeant). The nursery is part of a chain of 25 nurseries in five states, all of which deal primarily with the landscape industry. Surveys of the remaining 24-related nurseries are underway. Trace-back investigations of the Jasper County infestation, as well as the Confirmed Nursery Protocol (CNP), are underway.

The Washington Department of Agriculture has identified eight additional *P. ramorum*-positive nurseries, bringing the total number of confirmed WA nurseries to 10 in 2005. Eight of the 10 nurseries were found positive for *P. ramorum* in 2004. Of the eight new confirmations, four were retail nurseries in Pierce County, one was a retail facility in Thurston County, two were wholesale nurseries in King County, and one was a retail nursery in Skagit County. Identified hosts included primarily *Rhododendron*, but also *Kalmia*, *Viburnum*, and *Pieris*. In most of the trace-back investigations, out-of-state sources were identified as the cause of infection. CNP is underway at all of the facilities.

Oregon has confirmed six new *P. ramorum* findings since August, bringing the state's 2005 confirmation total to 20. Seven of the findings were a result of the federal order compliance survey, four were retail garden center survey confirmations, eight were trace-forward confirmations (including five nurseries and three other), and one was a trace-back confirmation. Four of the *P. ramorum*-positive sites were wholesale nurseries and 13 were retail facilities. Findings by county are: Benton(1), Clackamas(7), Curry(2), Deschutes(1), Lane(3), Lincoln(1), Marion(1), and Washington(4). Three of the *P. ramorum*-positive nurseries do ship out-of-state; all three ship primarily to the West Coast. CNP is complete or in progress at all locations.

***P. ramorum* federal order compliance agreements, trace-forward/-back** investigations, the USDA APHIS National Nursery Survey, and other investigations are ongoing. To date, 91 sites in seven states have had *P. ramorum* detections. Positive findings by state are: CA(53), GA(4), LA(2), OR(20), TN(1), SC(1), and WA(10).

MANAGEMENT

Congressman Pombo (CA) has requested that the Government Accountability Office (GAO) report on government responses to invasive species that threaten forest resources. In response, the GAO chose to report on Asian longhorned beetle, Emerald ash borer, and Sudden Oak Death/*Phytophthora ramorum*. With the site visits for the first two pests complete, the GAO will be visiting California from 9/19 – 9/22 to conduct the *P. ramorum* review of government programs dealing with this pathogen. While here, GAO representatives hope to gain insight into how *P. ramorum* got into the US, what damage it has and could cause, how efforts have minimized its impact to the forests, what risk assessments have been done and used for allocating resources, and what lessons have been learned that will be used to improve this or future responses. The USDA's APHIS and Forest Service, in cooperation with CDFA, the COMTF, CDF, Native Americans, County Agricultural Commissioners, nursery industry representatives, regulated states, and other stakeholders, are coordinating the compilation of information and site visits for the review.

RESEARCH

Brasier, Clive M., Beales, Paul A., Kirk, Susan A., Denman, Sandra, and Rose, Joan. August 2005. *Phytophthora kernoviae* sp. nov., an invasive pathogen causing bleeding stem lesions on forest trees and foliar necrosis of ornamentals in the UK. Mycological Research. 109 (8): 853-859.

A new *Phytophthora* pathogen of trees and shrubs, previously informally designated *Phytophthora* taxon C, is formally named here as *P. kernoviae*. *P. kernoviae* was discovered in late 2003 during surveys of woodlands in Cornwall, south-west England, for the presence of another invasive pathogen, *P. ramorum*. *P. kernoviae* is self-fertile (homothallic), having plerotic oogonia, often with distinctly tapered stalks and amphigynous antheridia. It produces papillate sporangia, sometimes markedly asymmetric with medium length pedicels. Its optimum temperature for growth is *ca* 18° C and upper limit *ca* 26°. Currently, *P. kernoviae* is especially noted for causing bleeding stem lesions on mature *Fagus sylvatica* and foliar and stem necrosis of *Rhododendron ponticum*. *P. kernoviae* is the latest of several invasive tree *Phytophthoras* recently identified in the UK. Its geographical origins and the possible plant health risk it poses are discussed.

Garbelotto, Matteo and Rizzo, David M. August 2005. A California-based chronological review (1995-2004) of research on *Phytophthora ramorum*, the causal agent of sudden oak death. Phytopathol. Mediterr. Vol. 44. No. 2.

This review describes in chronological order the events surrounding the discovery in California of the causal agent of the forest disease known as Sudden Oak Death. Advances in the understanding of this emergent disease have occurred over a very short period of time and include the elements of host-pathogen interactions, epidemiology, genetics, as well as the development of treatment options. Only three years from its discovery in California, the entire genome of *Phytophthora ramorum* was sequenced.

The availability of the genome offers endless possibilities for research, and it has already been tapped to provide the strongest evidence yet in support of an exotic nature of this pathogen both in California forests and in European nurseries. Finally, this emergent disease highlights the inevitable connectivity between the ornamental plant business and the health of native forests.

Werres, S. and Kaminski, K. August 2005. Characterisation of European and North American *Phytophthora ramorum* isolates due to their morphology and mating behaviour *in vitro* with heterothallic *Phytophthora* species. Mycological Research. 109 (8): 860-871.

Vegetative growth rate, and size of sporangia, chlamydospores and oospores from 94 *P. ramorum* isolates were measured and the isolates were paired *in vitro* with four different heterothallic *Phytophthora* species isolated from infected nursery plants in Germany. *P. ramorum* isolates originated from different European countries and from Canada and the USA. 66 of the 67 European isolates were determined as mating type A1; only one isolate was of mating type A2. Of the 27 North American isolates tested, seven (all from nurseries) were determined to be the A1 mating type and 17 to be the A2 mating type. Three isolates did not produce gametangia during the incubation period. Discriminant analysis of all data allowed a grouping based on the vegetative growth rate. The two groups corresponded with the mating type no matter whether the isolates originated from Europe or North America. The A1 isolates were much more homogeneous in their morphology than the A2 isolates. They grew faster, had larger chlamydospores and did not produce gametangia with *P. cambivora*. Within the A2 group, the single European isolate of mating type A2 (BBA 16/02) and three US isolates showed intermediate characters and were classified with the discriminant function into that of the opposite mating type. The morphological characters and the mating behaviour of the isolates will be discussed.

CALENDAR OF EVENTS

9/16 – Free Sudden Oak Death Workshop and Community Update from 10:00 a.m. – 3:30 p.m. at the Fort Ross State Historic Park Visitor Center, located at 19005 Pacific Coast Highway along the Sonoma Coast. For more information, contact Veronica Corella, Kashia Tribes office, at (707) 591-0580 x 104 or Kate Symonds, North Coast RC & D office, at (707) 569-9710.

9/23 – Washington Organic Recycling Council Organic Waste Processing Pathogen Control: Best Management Practices Workshop from 8:30 a.m. – 5:30 p.m. at Lewis & Clark State Park, Winlock, WA. This workshop is a follow-up training to the Sudden Oak Death workshop held in Puyallup last spring. The focus will be on pathogen management related to organic waste processing and handling. Registration fees are $125 for WORC members and $150 for non-members. The registration deadline is 9/19. For more information, or to register, go to: http://www.compostwashington.org/PDF/pathogenworkshop.pdf.

10/5 – 7 – European and Mediterranean Plant Protection Organization Conference on *Phytophthora ramorum* and other forest pests in Falmouth, Cornwall, Great Britain. For more information, or to register, go to: http://www.eppo.org/MEETINGS/2005_meetings/conf_phytra.htm.

10/7 – 9 – "Finding Balance Through Traditional Native Knowledge," California Indian Conference 2005, will be held at Humboldt State University. Themes for this year will be health, education, natural resources, and arts as they relate to traditional knowledge. The registration deadline is 9/9, and fees vary depending on age and student status. For more information, or to register, go to: http://www.humboldt.edu/~cic/.

HOSTS OF THE MONTH

***Acer laevigatum* (Evergreen maple) – is a frost-sensitive tree native to the Himalayas** and China, and can grow to 35 feet. Its leaves are lanceolate shaped and can grow five inches or more in length.

Evergreen maple was detected in a United Kingdom outdoor green area. Symptoms included chlorotic leaves and leaf necrosis.

References:

- http://www.malletcourt.co.uk/catalogfiles/pages/maples.htm

***Adiantum aleuticum* (Maidenhair fern) - is native to western North America and** thrives along shady moist banks, streamsides, and in serpentine soils. It has reddish-brown to black petioles, and its fronds create an airy effect, forking to make a fingerlike pattern atop slender stems reaching 1-2 ½ feet tall. The stems of this Maidenhair fern are used for designs in basketry by the Karok, Makah, Quinault, Tolowa, and Yurok. This fern is most commonly planted in containers or shaded beds.

Symptomatic *P. ramorum* maidenhair fern were found along the same Mendocino County tributary as infected *V. planipetala* and *T. californica* (see below). Symptomatic plants were found on a hillside associated with infected CA bay laurel, tanoak, Pacific yew, woodrose, CA honeysuckle, madrone, evergreen huckleberry, and toyon. Symptoms were similar to those observed on *Adiantum jordanii* (CA maidenhair fern), with necrotic areas on the leaves. The necrosis appeared to begin near the leaf margins and advance between the veins. Although some leaves were nearly or entirely necrotic, the disease did not appear to be fatal to the ferns. *P. ramorum* has been recovered from plated leaf tissue, but PCR testing has not been conducted. State and federal regulatory officials are reviewing the findings.

References:

- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 172.

- Central Washington Native Plants Gallery; *Adiantum aleuticum* http://www.cwnp.org/photopgs/adoc/adaleuticum.html
- Rainy Side Gardeners in the Pacific Northwest; Plant Gallery and Growing Guide – Native Plants; *Adiantum aleuticum* http://www.rainyside.com/features/plant_gallery/nativeplants/Adiantum_aleuticum.html

***Fraxinus latifolia* (Oregon ash) – is a deciduous tree that thrives in moist conditions** and is native to the West Coast of the US. It is most often found in central oak woodlands, northern oak woodlands, riparian environments, and yellow pine forests. Growing 40 - 80 feet tall and one to three feet in diameter, this is one of only a few native western trees with compound leaves. These pinnately compound leaves are five to 14 inches long, have five to nine leaflets that are broadly ovate, obobate, or elliptical, and are green above and paler in color below. The Oregon ash flower is dioecious, small, greenish-white in color, and borne in dense clusters. Its flat samaras are one to two inches long and are attached singly, but hang in clusters. The twigs of this tree are stout and round, with flattened nodes, and appear olive-gray when young, turning gray-brown with age. Its bark is thin, smooth, and gray-green when young, eventually thickening to 1 ½ inches and furrowed with thin, flat ridges and a gray-brown color. The wood of Oregon ash is used for making baseball bats and ax handles.

A *P. ramorum*-symptomatic Oregon ash was found at Sugarloaf State Ridge Park, along Sonoma Creek, near the visitor's center. The infected tree was part of a research plot established that included 10 *P. ramorum* infected CA bay laurel trees. Symptoms on the Oregon ash consisted of necrotic lesions developing on the leaves and along the leaf margins. Lesions had a grayish-brown color with a water-soaked appearance, similar to lesions caused by ash anthracnose. Leaf tissue isolations were made, and *P. ramorum* was recovered. PCR testing has not been performed. State and federal regulatory officials are reviewing the findings.

References:

- Reed College, Portland, Oregon; Trees of Reed website http://web.reed.edu/trees/TreePages/FRAX.html
- Las Pilitas Nursery; *Fraxinus latifolia*; Communities for Oregon Ash; http://www.laspilitas.com/plants/741.htm
- Virginia Polytechnic Institute and State University; Dendrology at Virginia Tech website; Oregon ash http://www.cnr.vt.edu/dendro/dendrology/syllabus/factsheet.cfm?ID=209

***Michelia doltsopa* (Michelia) – is an evergreen tree native to China. In its natural** Himalayan environment, it can grow to 90 feet, but it has only been found to grow to 25 feet in the western US. This tree varies from bushy, to narrow and upright. Its leaves are thin-textured, dark-green, and leathery, growing three to eight inches long and one to three inches wide. In the winter, furry brown buds open to blossoms ranging from

cream-colored to white, with a slight green tinge at the base. The flowers are five to seven inches across, with 12 to 16 segments that each grow to an inch wide. During flowering, this tree may be mistaken for a magnolia. Surviving in zones 14 – 24, H1, H2, this tree requires regular watering and part shade in its hottest climate range.

Michelia was detected in an outdoor green area of the United Kingdom. Michelia *P. ramorum* symptoms were limited to necrotic leaf lesions.

References:

- Canopy Trees for Palo Alto;Canopy Tree Library; http://www.canopy.org/db/main.asp?tree=39
- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 468.

***Osmorhiza chilensis* (Sweet Cicely) – grows in montane, subalpine, and woodland** environments, and is a native US perennial herb, occurring mostly in the west and in the northern states, stretching from the east to west. Sweet Cicely is found in open mixed or coniferous forests, forest edges, and thickets. Its erect stem ranges from nine to 40 inches long, and it is branched on the top portion of the plant. The coarsely toothed leaves extend out from a point into three parts, and further divide into three leaflets. Sweet Cicely flowers and seeds are spread in an upward pointing spray. Its seeds are nearly cylindrical. Its scented flowers are small, greenish-white, organized in loose umbrels, and pollinated by insects. The stems, leaves, seeds, and especially roots of this herb are sweet and often licorice flavored. Hence, the Greek genus name for Sweet Cicely: "osmo" meaning smell and "rhiza" meaning root. The name Chilensis is for the country of Chile where the plant was first collected in the late 1820s. This herb can be used in teas, stews, or soups.

P. ramorum was isolated from Sweet Cicely plants collected at Bouverie Preserve in Sonoma County. The plants were found near heavily infected CA bay laurel and dead and dying coast live oak. Symptoms observed included leaves with marginal necrosis, necrotic leaf lesions, and leaf dieback. In addition, *P. ramorum* infected Sweet Cicely was found in Humboldt County in association with *P. ramorum* infected maidenhair fern, as well as symptomatic CA bay laurel and canyon live oak. The sample was taken from private property west of Redway, near Redwood Creek. Symptoms observed consisted of marginal leaf necrosis, necrotic leaf lesions, and leaf dieback. Leaf tissue isolations were made, and *P. ramorum* was recovered. PCR has not been performed. State and federal regulatory officials are reviewing the findings.

References:

- Southwest Colorado Wildflowers, Osmorhiza http://www.swcoloradowildflowers.com/Yellow%20Enlarged%20Photo%20Pages/osmorhiza.htm

- University of Oregon; Environmental Studies Service Learning Program; Hendricks Park Project http://darkwing.uoregon.edu/~ecostudy/slp/hendricks/pdf_files/osmorhiza_chilensis.pdf

***Quercus petraea* (Sessile oak) – is one of only two oaks native to the United** Kingdom. This deciduous oak grows at a moderate rate to an average height of 60 to 80 feet, and often reaches 300 years of age. Its bark is grayish in color and has vertical cracks that form shapes called plates. The acorns are short at 1.2 inches, conical, broadest below the middle, and sit directly on twigs. The lobed leaves are more forward-pointing than *Quercus robur* (the other native UK oak), grow on stalks, are three to five inches in length, and a glossy dark-green color. The trunks of these trees are less branched, and the crown narrower, than the spreading shape of an English oak.

P. ramorum-infected Sessile oak was found in an outdoor green area of the UK. Symptoms on the tree were limited to bole cankers.

References:

- Great Britain Forestry Commission; Sessile oak - quercus petraea http://www.forestry.gov.uk/forestry/infd-5nlj46
- Isle of Skye Flora http://www.plant-identification.co.uk/skye/fagaceae/quercus-petraea.htm
- First Nature; *Quercus petraea* Sessile oak http://www.first-nature.com/trees/quercus_petraea.htm
- NC State University; Trees: *Quercus petraea* http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/quercus_petraea.html

***Torreya californica* (California nutmeg) – is a tree native to California; however, it is** rare and local, found along mountain streams, protected slopes, creek bottoms, and moist canyons of the Coast Range and the Sierra Nevadas. It is conical in shape, with wide spreading branches, and ranges in height from 15 to 70 feet. The bark of California nutmeg is gray-brown, thin, with shallow, irregular fissures, and scaly ridges. Its persistent, lance-shapped, flat, and aromatic needles are very stiff, one to three inches long, two-ranked, and are dark-green above and green below, with two narrow white lines. The twigs of this tree are slender, mostly paired, and yellow-green when young, turning reddish-brown with age. The flower of California nutmeg is dioecious. Male flowers are small, elliptical, pale yellow, and occur at the bases of leaves, while female flowers are tiny and consist of an ovule surrounded by a fleshy sac, and are borne on current year twigs. The fruit of this tree is an aril, with a fleshy outer green covering and an inner yellow-brown, thick-walled seed; it takes two years to mature.

P. ramorum-infected California nutmeg was found in Mendocino County along the same unnamed tributary as the infected Redwood ivy (see below). One understory

symptomatic California nutmeg was found near infected CA bay laurel, tanoak, CA honeysuckle, toyon, and madrone. Identified symptoms were similar to those seen on Douglas-fir, with wilted, necrotic shoots and twig cankers. *P. ramorum* was successfully recovered from the margins of the twig cankers, but not from necrotic needles. PCR testing has not been performed. State and federal regulatory officials are reviewing the findings.

References:

- Gymnosperm Database; *Torreya californica* http://www.botanik.uni-bonn.de/conifers/ta/to/californica.htm
- Virginia Polytechnic Institute and State University; Dendrology at Virginia Tech website; California nutmeg http://www.cnr.vt.edu/dendro/dendrology/syllabus/factsheet.cfm?ID=420
- Nearctica; Native Conifers of North America; Torreya californica http://www.nearctica.com/trees/conifer/taxus/Tcalif.htm

***Vancouveria planipetala* (Redwood ivy) – is a perennial herb native to southwest** Oregon and parts of California. It is evergreen, although it may lose its leaves during cold winters. Redwood ivy is a spreading plant, that usually grows five to 12 inches in height. Its leaves grow three to 11 inches and have a glabrous upper surface, with a glabrous to sparsely hairy lower surface. Flowers are white or lavender and are found in upright clusters of 25 to 30. Redwood ivy is found in coastal coniferous forests, and can grow in part sun to full shade, prefering cool, moist conditions.

P. ramorum-infected Redwood ivy was found in Mendocino County along the same unnamed tributary as the infected California nutmeg. Other *P. ramorum*-infected host plants present included CA bay laurel, tanoak, Pacific yew, woodrose, evergreen huckleberry, and CA honeysuckle. Symptoms consisted of necrotic lesions developing along the leaf margins. Lesions had a grayish-brown color and sometimes had a dark lesion margin. Small spots were observed beyond the lesions, and dead leaves were also observed. *P. ramorum* was recovered in culture; PCR testing has not been performed. State and federal regulatory officials are reviewing the findings.

References:

- Oregon State University; Department of Horticulture; Landscape Plants Volume 3 http://oregonstate.edu/dept/ldplants/vaplan.htm
- University of California Jepson Flora Project http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?1996,2012,2015
- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 644.